

Leveraging Plant-Microbe Interactions to Build Sustainable Ecosystems

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Over the past two decades, it has become increasingly clear that symbiotic host–microbe interactions alter the way in which plants grow and respond to abiotic and biotic stress. Harnessing diversity within these plant–microbe associations in managed ecosystems, provides an opportunity to create sustainable, multipurpose bioeconomies whereby globally important plant feedstocks can be produced while simultaneously maximizing soil health and mitigating adverse impacts to climate. Therefore, to increase sustainability within Department of Energy relevant biofeedstock plantations, I am leveraging genetic variation in the plant host to select for plants that are tolerant to abiotic stress and pairing these plants with belowground microbial partners to alter plant performance and ecosystem processes. Specifically, my research leverages a suite of molecular, physiological, and ecosystem level techniques and experiments to identify natural variation within diverse genotypes of *Populus* and characterize associated microbial communities under varied environmental conditions. As I identify these complex associations, I aim to build *Populus*-microbial associations within ecosystems that alter plant growth, plant tolerance to drought, and ecosystem carbon cycling.